**Armatha Jordan**

**Lesson (adapted from** [**http://learningtogive.org/lessons/unit124/lesson1.html**](http://learningtogive.org/lessons/unit124/lesson1.html)**)**

**Rubric adapted by Gina De Marco (previous session lesson plans)**

**Grade:** 4

**Topic:** Sustainability

**Time:** 30-45 minutes

My goal for this lesson is that my students will realize that each of us leaves unique footprints as we travel through life, whether it is the prints we leave on a trail, walking barefoot through the grass – or using natural resources. Our water footprint directly affects our way of life. Gallons and Gallons of water is wasted daily and can be conserved through sustainability. (Adapted from [www.**water**education.org/userfiles/2013\_springcaliforniawetgazette.doc](http://www.watereducation.org/userfiles/2013_springcaliforniawetgazette.doc)) The water footprint activity helps students and adults alike begin to understand, investigate and begin to measure their own water footprints. And think about water conservation actions.

**Summary**

Students become aware of their personal “water footprint”

**Objectives:**

*The learner will*:

* **identify** the many uses of water in our daily lives.
* **investigate** and begin to measure their own water footprint
* **determine** the amount of water that is used in various activities and come up with a plan that will sustain water and lessen their water footprint
* **develop** an increased awareness of water use and scarcity

**Standards**

**Students:**

**STANDARD 1- Analysis, Inquiry, & Design:**

*Key Idea 1: The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.*

* S1.3 Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed.
* S1.3a Clearly express a tentative explanation or description which can be tested

*Key Idea 3: The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.*

* S3.1 Organize observations and measurements of objects and events through classification-

and the preparation of simple charts and tables.

* S3.2 Interpret organized observations and measurements, recognizing simple patterns,

sequences, and relationships.

* S3.2a State, orally and in writing, any inferences or generalizations indicated by

the data collected

**STANDARD 7 - Connections**

*Key Idea 1:* The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/society, consumer decision-making, design, and inquiry into

phenomena.

•analyze science/technology/society problems and issues that affect their home, school,

or community, and carry out a remedial course of action

•make informed consumer decisions by applying knowledge about the attributes of

particular products and making cost/benefit trade-offs to arrive at an optimal choice

•design solutions to problems involving a familiar and real context, investigate

related science concepts to determine the solution, and use mathematics to model, quantify, measure, and compute

•observe phenomena and evaluate them scientifically and mathematically by con-

ducting a fair test of the effect of variables and using mathematical knowledge

and technological tools to collect, analyze, and present data and conclusions

**Teacher:**

1e: Designing Coherent Instruction

* Lessons that support instructional outcomes and reflect important concepts
* Activities that represent high-level thinking
* The use of varied resources
* Thoughtfully planned learning groups
* Structured lesson plan

3c: Engaging Students in Learning

* Activities aligned with the goals of the lesson
* Student enthusiasm, interest, thinking, problem-solving, etc
* Learning tasks that require high-level student thinking and are aligned with lesson objectives
* Students highly motivated to work on all tasks and are persistent even when the tasks are challenging
* Students actively “working,” rather than watching while their teacher “works.”
* Suitable pacing of the lesson: neither dragging nor rushed, with time for closure and student reflection

**Materials**

* *Common Water Uses and Amounts* (**worksheet**)
* Empty gallon jugs
* Math-counting blocks

*Student Recording Sheet for Water Usage* (**worlsheet)**

**Connections (these ideas would have been taught in prior lessons)**

Ask students to recall where water is located on the earth (oceans, rivers, ground, etc.). Ask if they recall how much of this water we can actually use (fresh water) where the most water is located (Oceans). Re-interate that only a small percentage of that water is fresh water that we use for (discussion see below and handout 1 )

**Procedure**

*Begin class by asking students to estimate the amount of water they use each day. Have students write down their estimates and put them aside for future reference.*

* In cooperative groups of three students, ask the class to brainstorm all the ways they can think of that they use water every day.
* Compile a class list of the answers the groups made. Ask the students to share the amounts they estimated at the beginning of class. (Note: you will get a very wide range.)
* Distribute statistics that show how much water various activities use (**Attachment One**). Using an empty gallon jug, explain that two-thirds of the people in the world use just thirteen gallons of water each day. Ask how this compares with their estimates. Explain that the average American uses approximately 100-105 gallons of water each day. Provide the class with statistics that show the amount of water it takes to produce several common items we use every day such as tomatoes, a gallon of milk, energy to light a light bulb, production of newsprint, etc. (**Attachment One**). Ask for reactions to these statistics.
* Using math-counting blocks of 100 to represent the total amount of water on the earth, ask student to guess how much is available for use by humans and animals. After several estimates, explain that only three percent of the total amount of water is fresh water and of that three percent, one percent is actually available for use. The rest is too deep underground or locked up in ice caps. Ask students to turn to their neighbor and make a generalization about the amount of water that is available. (Water is extremely limited for actual use.)
* Provide *Student Recording Sheet for Water Usage* (**Attachment Two**) for students to record the amount of water they use for the next 24 hours. This will be the homework assignment.

**Assessment:**

Students will be assessed by teacher observation of the involvement of the students and by the completion of the recording sheets.

**Wrap Up/Closure**

.**School/Home Connection:**

Students will take the recording sheets home and record their water usage for the 24-hour period

**Extensions**

***-Students should visit wateruseitwidely.com/kids to explore more ideas about the sustainability of water***

***-Students can create a written action plan that explains how they will lesson their carbon footprint***

**Assessment**

Teacher will circulate and monitor throughout the lesson to make informal assessments.  Use the student observations to formally assess student’s understanding according to rubric. Teacher should have a checklist with students name and an area to record the appropriate grade on the rubric to the students name.

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| --- | --- | --- | --- | --- |
|  | 4 | 3 | 2 | 1 |
| **Student Understanding** | • There is evidence that the student has a **full and complete** understanding of the question or problem.  • The supporting scientific evidence is complete and demonstrates a full integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has a **general** understanding of the question or problem.  • The supporting scientific evidence is generally complete with some integration of scientific concepts, principles, and/or skills. | • There is evidence that the student has **minimal** understanding of the question or problem.  • The supporting scientific evidence is minimal. | • There is evidence that the student has **no** understanding of the question or problem. |
| **Student Response** | The response reflects a complete synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response reflects some synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response provides little or no synthesis of information, such as data, cause-effect relationships, or other collected evidence. | The response is completely incorrect or irrelevant or there is no response. |
| **Terminology** | The accurate use of scientific terminology strengthens the response. | The accurate use of scientific terminology is present in the response. | The accurate use of scientific terminology may not be present in the response. | The accurate use of scientific terminology may not be present in the response. |
| **Application of Knowledge** | An effective application of the concept to a practical problem or real-world situation reveals a complete understanding of the scientific principles. | An application of the concept to a practical problem or real-world situation reveals a general understanding of the scientific principles. | An application, if attempted, is minimal. | An application, if attempted, is minimal. |

**Lesson 1:** [**Where Has All the Water Gone?**](http://learningtogive.org/lessons/unit124/lesson1.html)  
**Handout 1**

**Common Water Uses and Amounts**

**Directions:** Use these examples to get a reasonable estimate of the amount of water used   
for each of the following activities.

**Water Usage Information**

|  |  |
| --- | --- |
| **Water Usage** | **Number of Gallons Used** |
| Flush a toilet | 3-5 |
| Full bath in tub | 36-50 |
| Wash hands (with water running) | 4 gallons per minute |
| Brush teeth (with water running) | 2-10 |
| Dishwasher | 8-12 per load |
| Wash clothes | 20-50 per load |
| Drinking water | 2-12 |
| Cooking | 10 |
| Washing the car | 100 |

For the latest information on the relationship between production and water consumption, go to the Water Footprint website <http://www.waterfootprint.org/?page=files/home> See examples under the heading "The relation between consumption and water use."

On an average, globally, it takes the following amounts of water to produce the following foods:

* 70 liters of water to produce one apple
* 15,500 liters of water per kg of beef.
* 40 liters of water to produce one loaf of bread
* 3,900 liters for 1 kg of chicken meat
* 1,000 liters of water to produce 1 liter of milk

**Name:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_        **Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**H2O Diary: How Much Water Do You Use?**

**Hypothesis:** How many gallons of water does the average person use per day?  
  
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**Direction:** This survey is to be conducted truthfully over the course of one week. Put a tally mark in the Times Per Day column very time someone living in your home does the activity.  
  
**Weekly Water Use Survey**

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| |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Activity** | **Times Per Day** | | | | | | | **Weekly Total** | **Estimated Amount of Water Used (in gallons)** | **Total Weekly Water Used** | |  | Sun | Mon | Tues | Wed | Thurs | Fri | Sat |  |  |  | | Toilet Flushing |  |  |  |  |  |  |  |  | \* 5 |  | | Short Shower (5-10 minutes) |  |  |  |  |  |  |  |  | \* 25 |  | | Long Shower (>10 minutes) |  |  |  |  |  |  |  |  | \* 35 |  | | Tub Bath |  |  |  |  |  |  |  |  | \* 35 |  | | Brushing Teeth (running water) |  |  |  |  |  |  |  |  | \* 2 |  | | Brushing Teeth (water turned off) |  |  |  |  |  |  |  |  | \* 0.25 |  | | Shaving |  |  |  |  |  |  |  |  | \* 2 |  | | Washing Dishes (running water) |  |  |  |  |  |  |  |  | \* 30 |  | | Washing Dishes (Filling a basin) |  |  |  |  |  |  |  |  | \* 10 |  | | Running a Dishwasher |  |  |  |  |  |  |  |  | \* 20 |  | | Washing Clothes |  |  |  |  |  |  |  |  | \* 35 |  | | Watering Lawn |  |  |  |  |  |  |  |  | \* 300 |  | | Washing Car |  |  |  |  |  |  |  |  | \* 50 |  | | Total Weekly Water Use (gallons) | | | | | | | | | = |  | | Average Daily Water Use (gallons) | | | | | | | | | /7 = |  | | Average Individual Daily Water Use (gallons) | | | | | | | | | / by number of people living at home = |  | |